

## CORRELATION BETWEEN GAS PHASE SPECIES AND NUCLEATION EPISODES OBSERVED DURING ACE-1

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Findings from earlier field studies indicated that rates of new particle formation in the remote troposphere can be significantly higher than those predicted by classical theory for sulfuric acid - water nucleation [Weber, 1995; Weber, 1997] . We have speculated that higher rates may be due to the participation of ammonia [Weber, 1996] . However, this hypothesis could not be tested since ammonia was not measured during these studies.

More extensive data was acquired during the Southern Hemisphere Marine Aerosol Characterization Experiment (ACE-1) conducted from October 31 to December 22, 1995. As part of this campaign, aircraft based measurements of gas phase species pertinent to studies of new particle formation included sulfuric acid, water, and ammonia. In addition, size distributions of 3 to 10 nm diameter particles were obtained from ultrafine condensation particle counter photo-detector pulse height distributions [Saros, 1996] .

During ACE-1, episodes in which the smallest detectable particles dominated the nano-particle number distribution were periodically recorded and were likely due to passage through regions where nucleation was occurring. These episodes were observed in primarily three different situations: 1) Downwind of penguin rookeries on the lee coast of Macquarie Island; 2) In thin high humidity layers at altitudes between 2 and 4 km situated above temperature inversions; and, 3) In regions of cloud outflow; situations similar to those previously reported by Hegg et al. [1990]. The latter location was the most frequent site for particle formation observed during ACE-1. This paper will focus on the correlation between gas phase species and nucleation events so as to gain insight into the mechanisms of particle formation observed during ACE-1.